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| 10/562,098 | 12/21/2005 | Takashi Ito | 9369-114US (T37-196236C) | 8148 |
| 570. 7590 08/22/2011 PANITCH SCHWARZE BELISARIO & NADEL, LLP ONE COMMERCE SQUARE 2005 MARKET STREET, SUITE 2200 PHILADELPHIA, PA 19103 | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptomail@panitchlaw.com

Office Action Summary

Application No.

10/562,098

Applicant(s)

ITO ET AL.

Examiner

ANCA EOOF

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 7, 8 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 7, 8 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1, 7, 8 and 10 are pending. Claims 2-6 and 9 have been canceled.
2. The certified English translation of the foreign priority document JP 2003-180470 filed on June 25, 2003 was received and acknowledged.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crivello (US Patent 5,639,413) in view of Date et al. (WO 02/48101, wherein the citations are from the English equivalent document US 2004/0030158).

With regard to claims 1 and 10, Crivello teaches a photopolymer mixture comprising epoxy materials, (meth)acrylate materials and a cationic photoinitiator (column 2, lines 35-45).

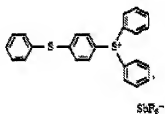
Crivello further teaches that the photopolymer mixture includes epoxy resins (column 8, lines 51-67), which are equivalent to the "cationic-polymerizable organic compound comprising at least one compound having an epoxy group" of claim 1 of the instant application.

The cationic photoinitiator of Crivello is equivalent to the "photoinitiator for cationic polymerization" of claim 1 of the instant application.

Crivello further teaches that the photopolymer mixture may include acrylate or methacrylate materials which are polymerized by a free radical mechanism (column 2, lines 42-43 and column 8, lines 18-21), which are equivalent to the "radical polymerizable-organic compound comprising at least one compound having a (meth)acryl group" of claim 1.

Crivello further teaches free radical photoinitiators, such as benzoin butyl ether, 2,2-diethoxyacetophenone (column 8, lines 25-28), which are equivalent to the "ultraviolet light-sensitive photoinitiator for radical polymerization" of claim 1.

Crivello et al. teach that a preferred cationic photoinitiator is:



(see formula (XVI) in column 7, lines 25-30 and Example 1 in column 12, lines 65-66).

Crivello further teaches that propylene carbonate is a commonly-used carrier for incorporating the photoinitiator in the composition (column 14, lines 65-67). The Examples 2-6 show that the propylene carbonate was used as carrier for the diphenyl(4-thiophenoxyphenyl)sulfonium hexafluoroantimonate (see table 2 in column 15, lines 1-17 and the definition of "photoinitiator X" in column 12, lines 65-66).

The diphenyl(4-thiophenoxyphenyl)sulfonium hexafluoroantimonate of Crivello is equivalent to the "photoinitiator for cationic polymerization of formula (I)" on claim 1, wherein M is an antimony atom.

The diphenyl(4-thiophenoxyphenyl)sulfonium hexafluoroantimonate of Crivello meets the limitations of claim 1 for "the photoinitiator for cationic polymerization is the only component in the composition dissolved in propylene carbonate prior to being combined with other components to form the resin composition".

However, Crivello does not teach the purity of the cationic-polymerization initiator of formula (I), as required by claims 1 and 10 of the instant application.

Date et al. disclose a method of manufacturing sulfonium salts used as photocationic polymerization initiators for resists (par.0045).

In Example 5, Date et al. disclose the synthesis of (4-phenylthiophenyl) diphenylsulfonium hexafluoroantimonate with a purity of 99% (par.0063-0065). It is not explicitly specified that (4-phenylthiophenyl) diphenylsulfonium hexafluoroantimonate is synthesized in Example 5 but the ingredients are the same as for Example 2 which leads to (4-phenylthiophenyl) diphenylsulfonium hexafluorophosphate except that potassium hexafluoroantimonate replaces potassium hexafluorophosphate. Date et al. further disclose that ¹³C-NMR analysis and IR analysis indicated that the (4-phenylthiophenyl) diphenylsulfonium hexafluoroantimonate comprises small amount of raw materials diphenyl sulfoxide, diphenyl sulfide(par.0052-0053 and par.0063-0064).

The (4-phenylthiophenyl) diphenylsulfonium hexafluoroantimonate of Date et al. is the same compound as the diphenyl(4-thiophenoxyphenyl)sulfonium hexafluoroantimonate of Crivello.

Therefore, it would have been obvious for one of ordinary skill in the art to use the (4-phenylthiophenyl) diphenylsulfonium hexafluoroantimonate with a purity of 99% of Date et al. as cationic photoinitiator in the photopolymer mixture of Crivello, as Date et al. specifically indicate this use for the high-purity sulfonium salts.

It is the examiner's position that there is no compound represented by formula (II) of the instant application in the (4-phenylthiophenyl) diphenylsulfonium hexafluoroantimonate of Example 5 of Date et al.

Therefore the limitations of claims 1 and 10 for the quantity of compound of formula (II) are met.

The photopolymer mixture of Crivello is used for stereolithography (column 1, line 5), wherein the photopolymer mixture cures upon exposure with radiation.

Therefore, the photopolymer mixture of Crivello modified by Date is equivalent to the "resin composition for stereolithography, which is an actinic radiation-curable resin composition" of claims 1 and 10 of the instant application.

With regard to claim 8, Crivello teaches that the medium may comprise vinyl and 1-propenyl ether monomers, such as diethylene glycol divinyl ether (column 8, lines 37-42), which is equivalent to the "polyalkylene ether compound" of claim 8.

Crivello further teaches that the vinyl or 1-propenyl ethers are in a range of preferably 10-25% by weight of the photopolymer mixture (column 8, lines 46-50).

The total cationic polymerizable components in the photopolymer mixture of Crivello may be about 70% by weight (considering that the total of (meth)acrylates and free radical polymerization initiator is 25% by weight and the cationic polymerization initiator is 5% by weight, as taught in column 8, lines 15-17 and 35-36).

When the amount of diethylene glycol divinyl ether is 15% by weight of the photopolymer mixture (within the range of 10-25% by weight of Crivello), the amount of diethylene glycol divinyl ether is 21% by weight of the cationic polymerizable compounds.

This amount is within the range of claim 8 of the instant application.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Crivello (US Patent 5,639,413) in view of Date et al. (WO 02/48101, wherein the citations are from the English equivalent document US 2004/0030158) as applied to claim 1 and in further view of Steinmann (US Pg-Pub 2004/0137368).

With regard to claim 7, Crivello modified by Date teach a photopolymer mixture equivalent to the resin composition of claim 1 (see paragraph 4 of the Office Action) but fail to disclose that the photopolymer mixture further comprises an oxetane compound.

Steinmann discloses a radiation-curable composition comprising: at least one cationically polymerizing organic substance, at least one free-radical polymerizing organic substance, at least one cationic polymerization initiator, at least one free-radical polymerization initiator (par.0023-0027) and at least one hydroxyl-functional oxetane compound (par.0029).

The composition of Steinmann et al. gives exceptionally high photospeed, has low humidity sensitivity and high temperature resistance (par.0002).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to add a hydroxyl-functional oxetane compound, as disclosed by Steinmann, to the photopolymer mixture of Crivello modified by Date, in order to improve the photospeed and temperature resistance and lower the humidity sensitivity of the photopolymer mixture.

The hydroxyl-functional oxetane compound (F) of Steinmann et al. is equivalent to the oxetane compound of claim 7 of the instant application.

Steinmann et al. teach that an oxetane compound may be comprised in the composition in an amount of 26.78 wt.% with respect to a cationic polymerizable compound with epoxy groups (see Example 1 in table 2, par.0151, wherein the oxetane compound is Cyracure UV 6000 and the epoxy compound is Cyracure 6110, as defined in Table 1, par.0143).

Response to Arguments

6. Applicant's arguments with respect to the amended claims 1, 7, 8 and 10, see pages 4-8 of the Remarks filed on June 07, 2011 have been considered but are moot in view of the new grounds of rejection.

With regard to the applicant's arguments on pages 4 and 7 of the Remarks, the examiner would like to note that:

– the rejection of claims 1 and 10 under 35 USC 103(a) over Okhuma et al. (US Patent 5,776,634) in view of Date et al. (WO 02/48101, wherein the citations are from the English equivalent document US 2004/0030158), and

– the rejection of claims 7 and 8 under 35 USC 103(a) over Okhuma et al. (US Patent 5,776,634) in view of Date et al. (WO 02/48101, wherein the citations are from the English equivalent document US 2004/0030158) as applied to claim 1 and in further view of Steinmann (US 2004/0137368) have been withdrawn following the applicant's amendment to claim 1.

However, new grounds of rejection for the amended claims 1, 7, 8 and 10 are presented in paragraphs 3-5 above.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Lawton et al. (US Patent 6,379,866) teach a composition comprising epoxide-containing material, a free-radical acrylic material, a cationic photoinitiator and a free-radical initiator (column 4, lines 62-65), wherein the sulfonium cationic photoinitiator is a solution in propylene carbonate prior to being combined with the other components to form the composition (see column 17, lines 61-65).

8. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANCA EOFF whose telephone number is (571)272-9810. The examiner can normally be reached on Monday-Thursday, 6:30 AM-4:00 PM, EST and Friday, 6:30-10:30 AM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H. Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anca Eoff/

Primary Examiner, Art Unit 1722